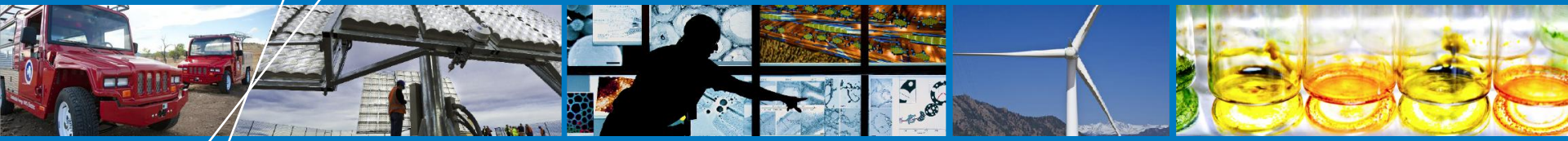
NREL
NATIONAL RENEWABLE ENERGY LABORATORY

DOE Tribal Energy Program

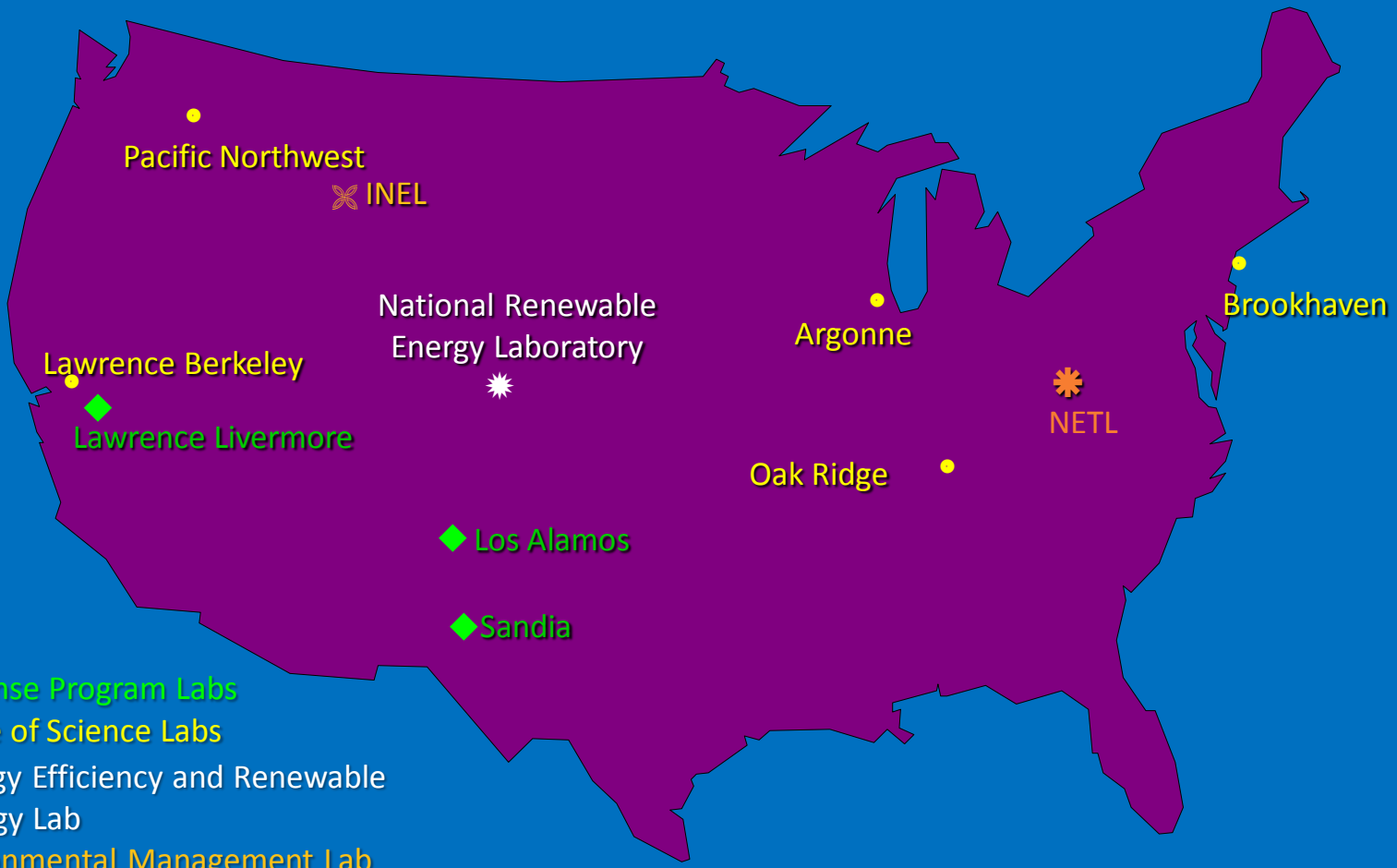


Peer Review 2012

Roger Taylor

April 24, 2012

Major DOE National Laboratories



NREL
NATIONAL RENEWABLE ENERGY LABORATORY

Leading the Way to a Clean Energy Future

Laboratory Snapshot

Only National Laboratory Dedicated Solely to Energy Efficiency and Renewable Energy

- Leading clean-energy innovation for 34 years
- 1740 employees with world-class facilities
- Campus is a living model of sustainable energy
- Owned by the Department of Energy
- Operated by the Alliance for Sustainable Energy

Scope of Mission

Energy Efficiency

- Residential Buildings
- Commercial Buildings
- Personal and Commercial Vehicles

Renewable Energy

- Solar
- Wind and Water
- Biomass
- Hydrogen
- Geothermal

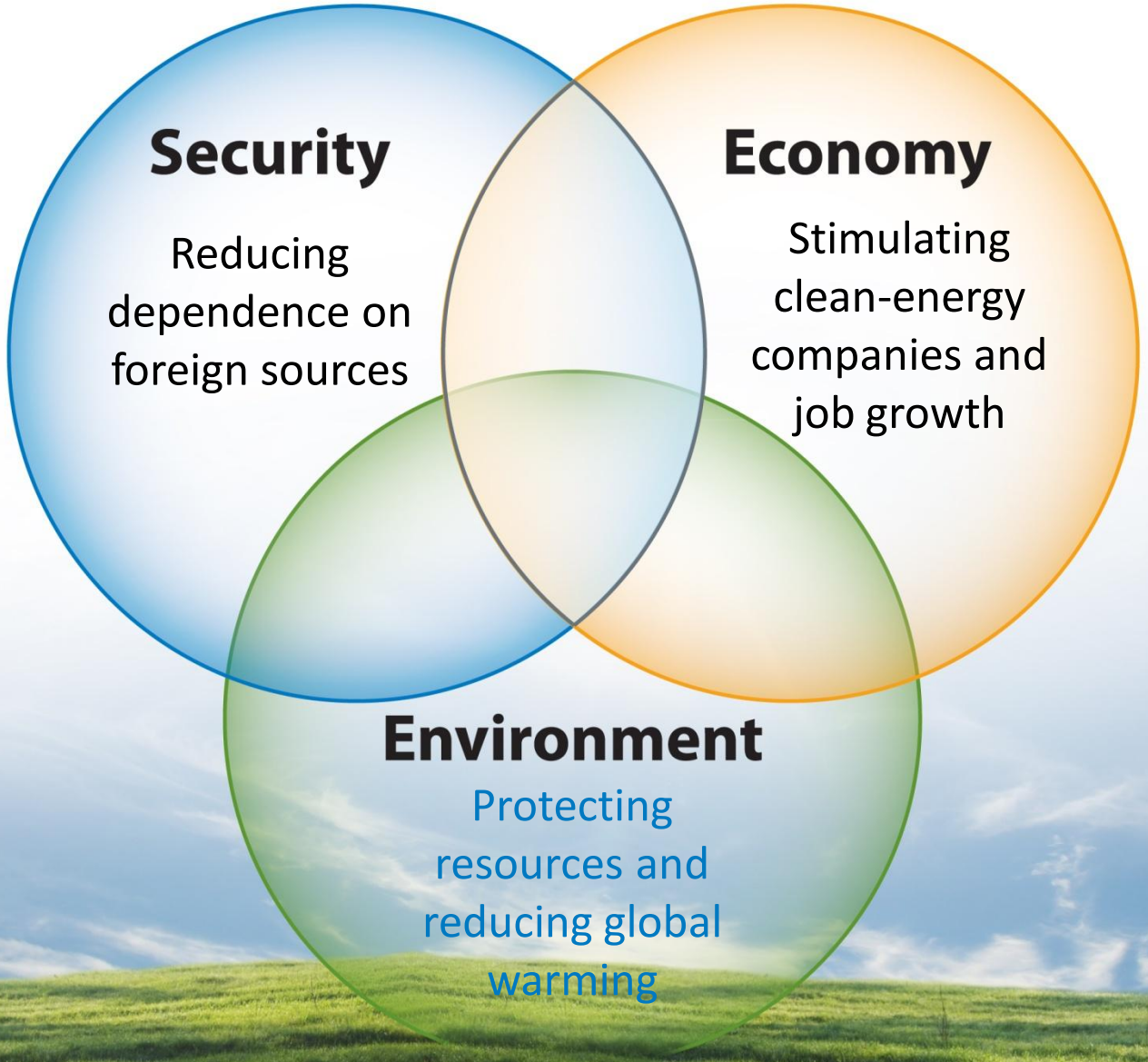
Systems Integration

- Grid Infrastructure
- Distributed Energy Interconnection
- Battery and Thermal Storage
- Transportation

Market Focus

- Private Industry
- Federal Agencies
- Defense Dept.
- State/Local Govt.
- International
- AI & AN Tribes

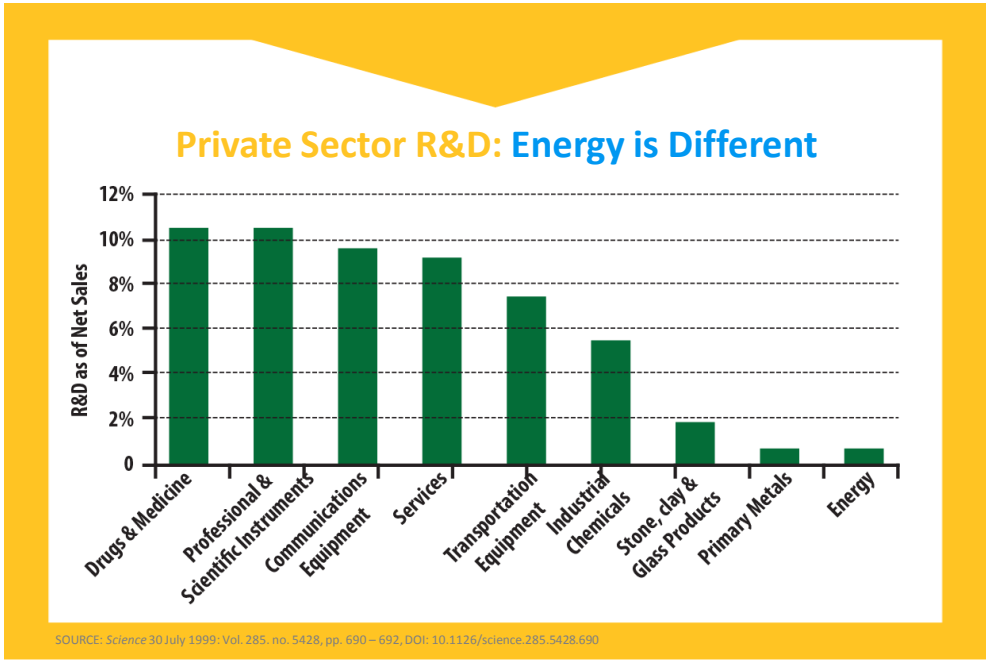
National Energy Imperatives



Challenges to Success

Energy Market Barriers

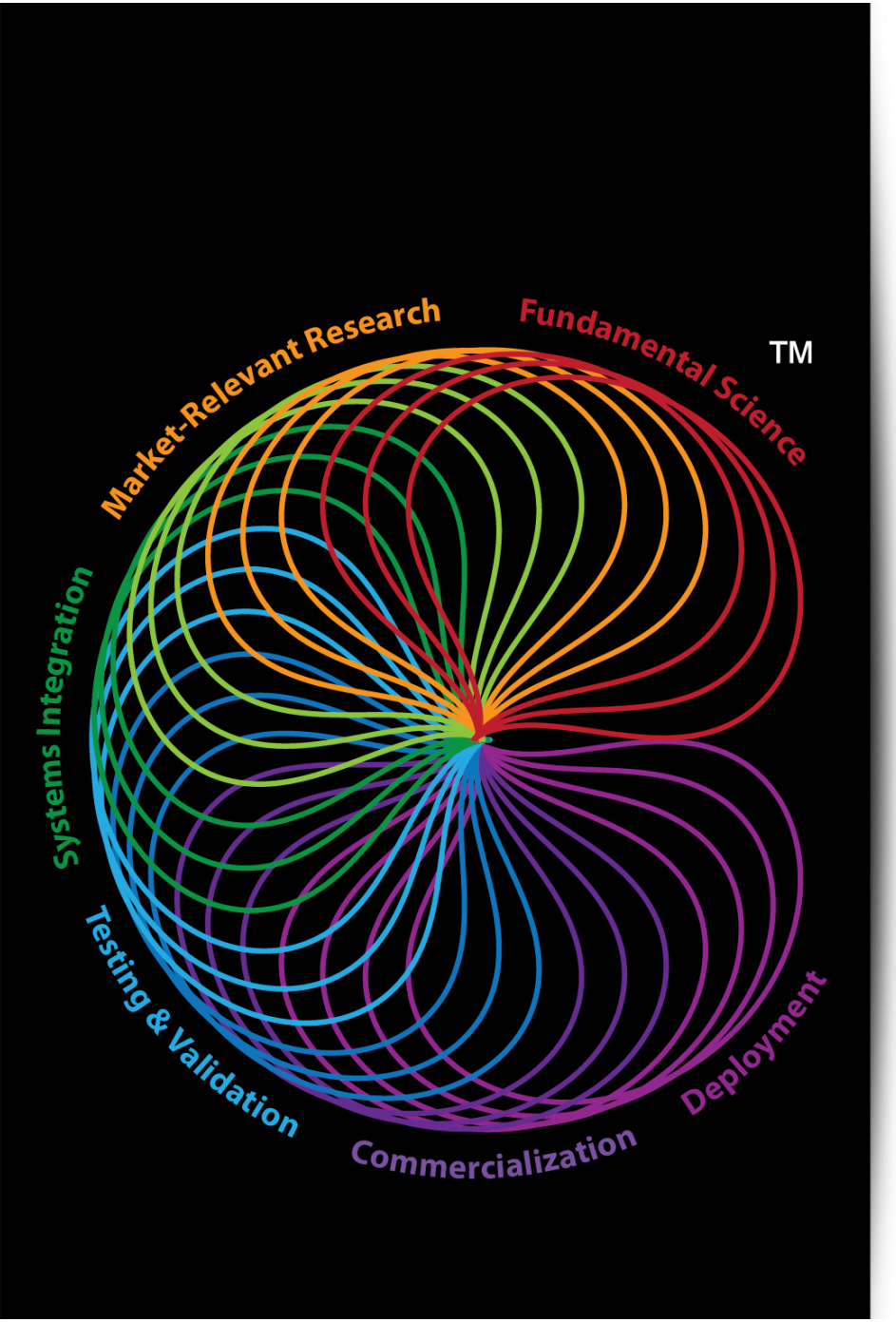
- Inconsistent policies
- Aging infrastructure
- Undifferentiated commodity
- Lack of knowledge
- Limited private investment



NREL's Solutions Role

Reducing Investment Risk

- Licensing technology
- Establishing RD&D agreements
- Offering unique research and testing partnering facilities
- Providing analysis and expertise to inform decisions and catalyze market adoption



Spectrum of Innovation

From Science through Deployment

- Comprehensive approach to innovation
- Collaboration with private industry
- Connects science to the marketplace
- Delivers market-relevant technologies and competitive clean-energy products

innovation



Bank of America

ABENGOA SOLAR

ALSTOM

RF
MICRO·DEVICES

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JOHNSON
MATTHEY

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SPECTROLAB
A BOEING COMPANY

LOCKHEED MARTIN

DOW

Xcel Energy

KONARKA

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Thin-film solar

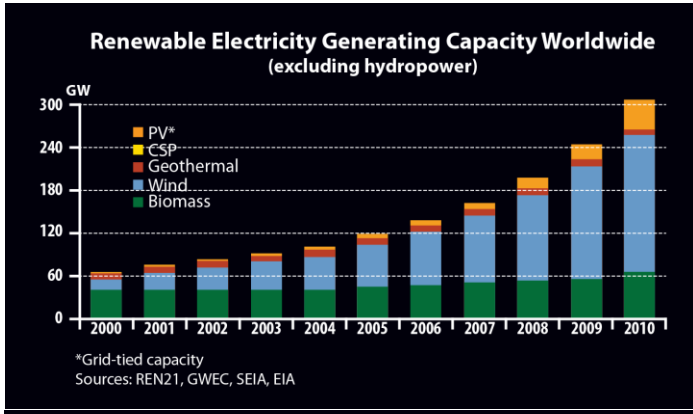
PardeeHomes
Where smart solutions live.

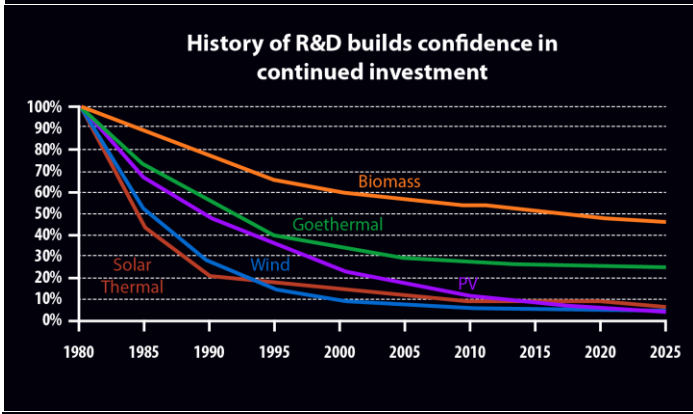
AWS Truewind

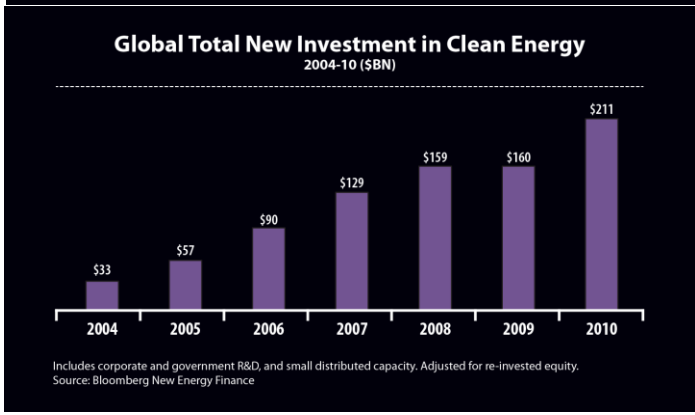
Decade of Global Progress: 2000 – 2010

Increasing Capacity, Improving Efficiency, Reducing Costs, Expanding Investment

- Wind power capacity increased by a factor of 10 – to more than 200 gigawatts
- Solar PV capacity grew by factor of 30 – to approximately 35 gigawatts
- Biofuels emerged as a major industry – producing approximately 28 billion gallons annually
- LEED-certified commercial buildings increased to more than 10,000
- Costs reduced significantly – approaching grid parity
- Clean energy investment grew from $33B in 2004 – to $211B in 2010







Innovation for the Future

Integrating/Upgrading Electrical Systems

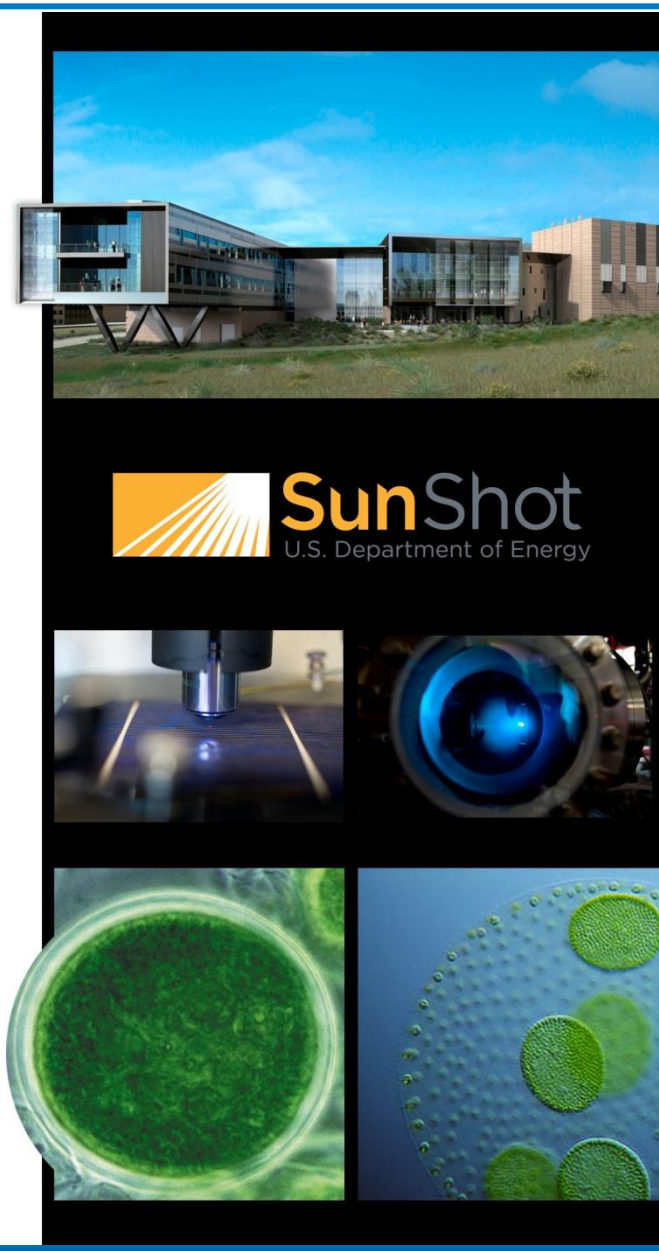
- Energy Systems Integration Facility (ESIF)
- Integrating renewable energy at all scales

Implementing DOE SunShot Solar Initiative

- Lowering cost of solar energy systems by 75% by 2020
- Cost competitive without subsidies to enable large-scale adoption across the US

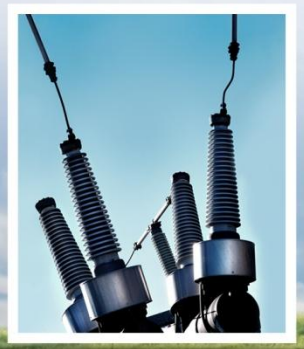
Achieving Scientific Breakthroughs

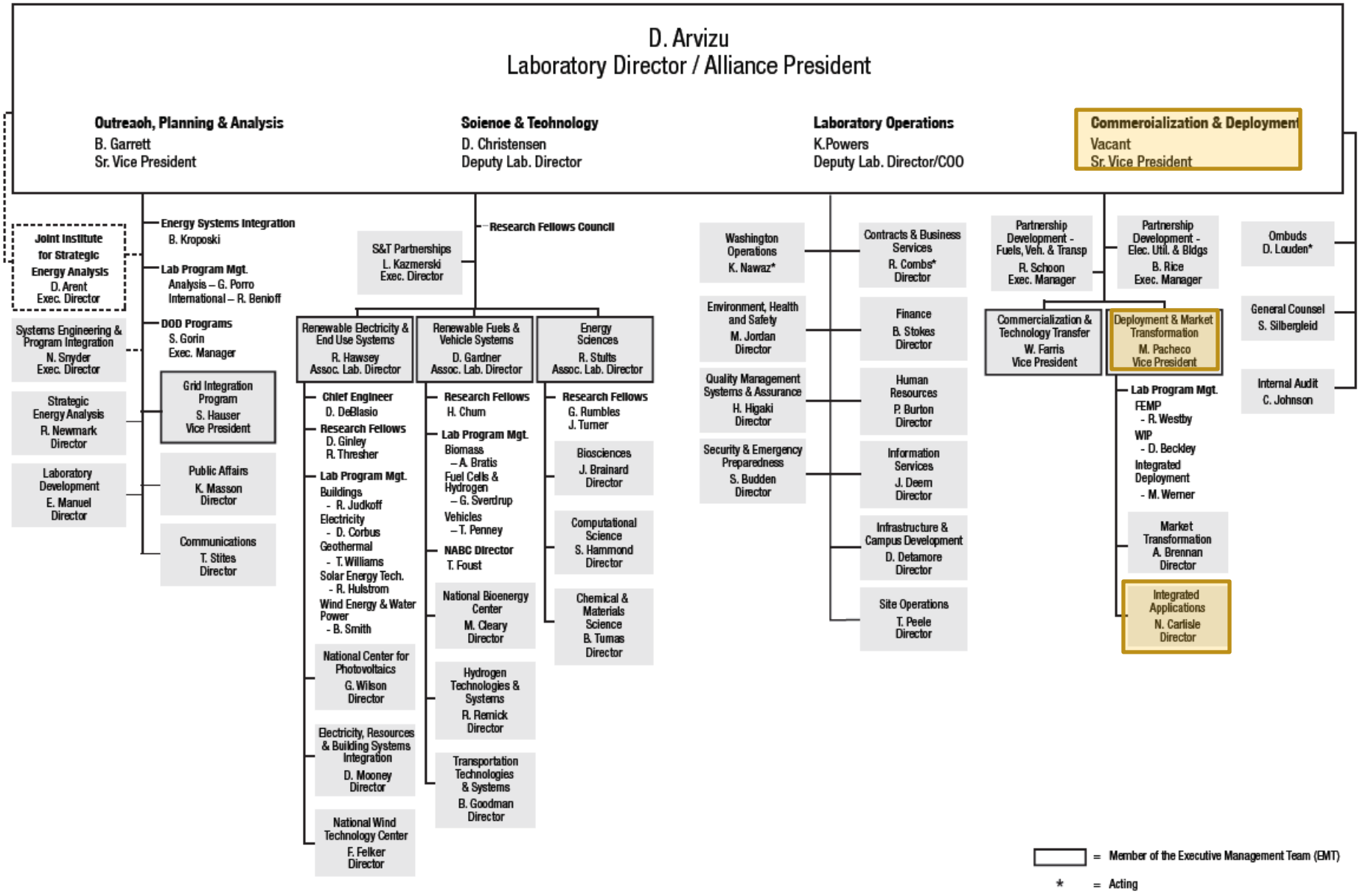
- Multi-Exciton Generation – potentially improving photovoltaic solar efficiency by 30%
- Advanced Biofuels – enabling cost-effective refining into transportation fuels



NREL's Energy Vision

A clean and sustainable energy system contributing to economic prosperity, enhancing national security, and maintaining environmental quality




D. Arvizu
Laboratory Director / Alliance President
Outreaoh, Planning & Analysis
B. Garrett
Sr. Vice President
Soienoe & Teohnology
D. Christensen
Deputy Lab. Director
Laboratory Operations
K.Powers
Deputy Lab. Director/COO
Commeroialization & Deployment
Vacant
Sr. Vice President
Joint Institute for Strategic Energy Analysis
D. Arent
Exec. Director
Systems Engineering & Program Integration
N. Snyder
Exec. Director
Strategic Energy Analysis
R. Newmark
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Energy Systems Integration
B. Kroposki
Lab Program Mgt.
Analysis – G. Porro
International – R. Benioff
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S. Hauser
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T. Stites
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S&T Partnerships
L. Kazmerski
Exec. Director
Research Fellows Council
Renewable Electricity & End Use Systems
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Assoc. Lab. Director
Chief Engineer
D. DeBlasio
Research Fellows
D. Ginley
R. Thresher
Lab Program Mgt.
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Electricity
- D. Corbus
Geothermal
- T. Williams
Solar Energy Tech.
- R. Hulstrom
Wind Energy & Water Power
- B. Smith
National Center for Photovoltaics
G. Wilson
Director
Electricity, Resources & Building Systems Integration
D. Mooney
Director
National Wind Technology Center
F. Felker
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Renewable Fuels & Vehicle Systems
D. Gardner
Assoc. Lab. Director
Research Fellows
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Lab Program Mgt.
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Vehicles
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Chemical & Materials Science
B. Tumas
Director
Washington Operations
K. Nawaz*
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M. Jordan
Director
Quality Management Systems & Assurance
H. Higaki
Director
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S. Budden
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Contracts & Business Services
R. Combs*
Director
Finance
B. Stokes
Director
Human Resources
P. Burton
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D. Detamore
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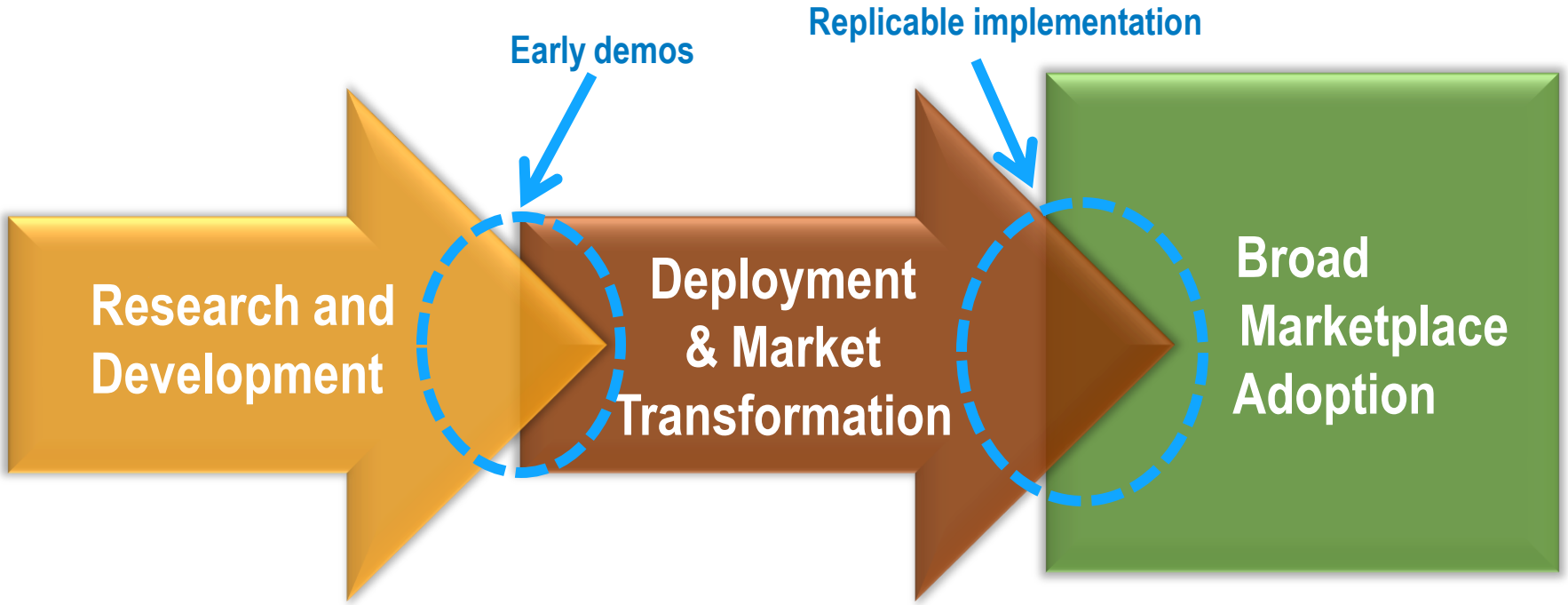
W. Farris
Vice President
Partnership Development - Elec. Util. & Bldgs
B. Rice
Exec. Manager
Deployment & Market Transformation
M. Pacheco
Vice President
Lab Program Mgt.
FEMP
- R. Westby
WIP
- D. Beckley
Integrated Deployment
- M. Werner
Market Transformation
A. Brennan
Director
Integrated Applications
N. Carlisle
Director
Ombuds
D. Louden*
General Counsel
S. Silbergleid
Internal Audit
C. Johnson
= Member of the Executive Management Team (EMT)
* = Acting

Deployment & Market Transformation

Role in Energy Transformation



Deployment & Market Transformation

- Clean Cities
- Alternative Fuels & Advanced Vehicle Data Center
- Regional Workshops
- Coordination with R&D and Industry Groups

Deployment & Market Transformation

- Wind for Schools
- Workforce Development
- State Wind Working Groups and Regional Wind Energy Institutes
- 80-m and 100-m Wind Resource Maps
- Jobs and Economic Development Impacts (JEDI) model
- Tribal Energy Program

Deployment & Market Transformation

Alaska: 17.6 MW Fire Island Wind Project

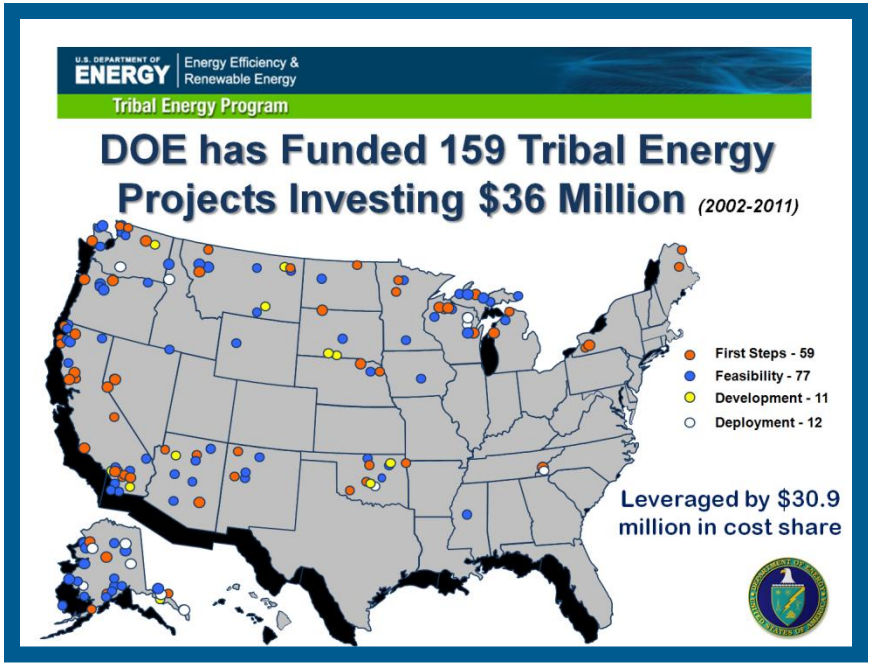
- **NREL engagement for more than a decade**
- **Project stalled**
- **NREL re-invigorated project**
  - Facilitated dialog
  - Provided technical assistance

Deployment & Market Transformation

Tribal Energy Program

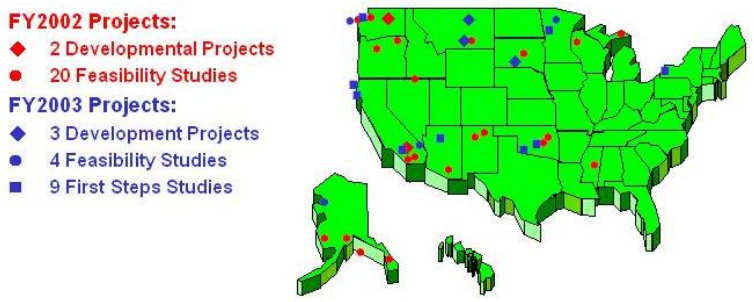
- Program Support
- Collaborations
- Tribe-specific Technical Assistance

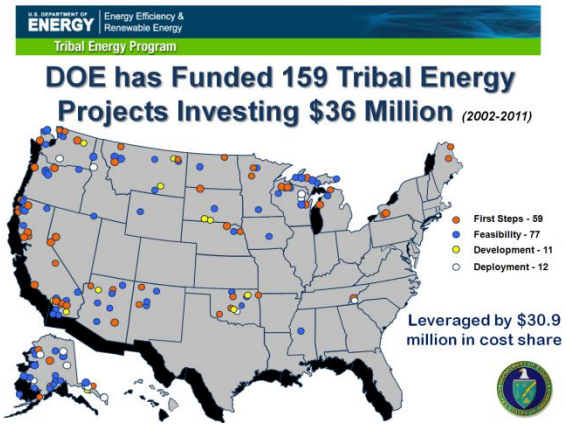
- Training Discussion at 3:45



Tribal Energy Program: Technical Support

- Annual solicitations: RFP input and proposal reviews
- Annual Program Review logistics
- Web-site development/support
- Brochure development/production



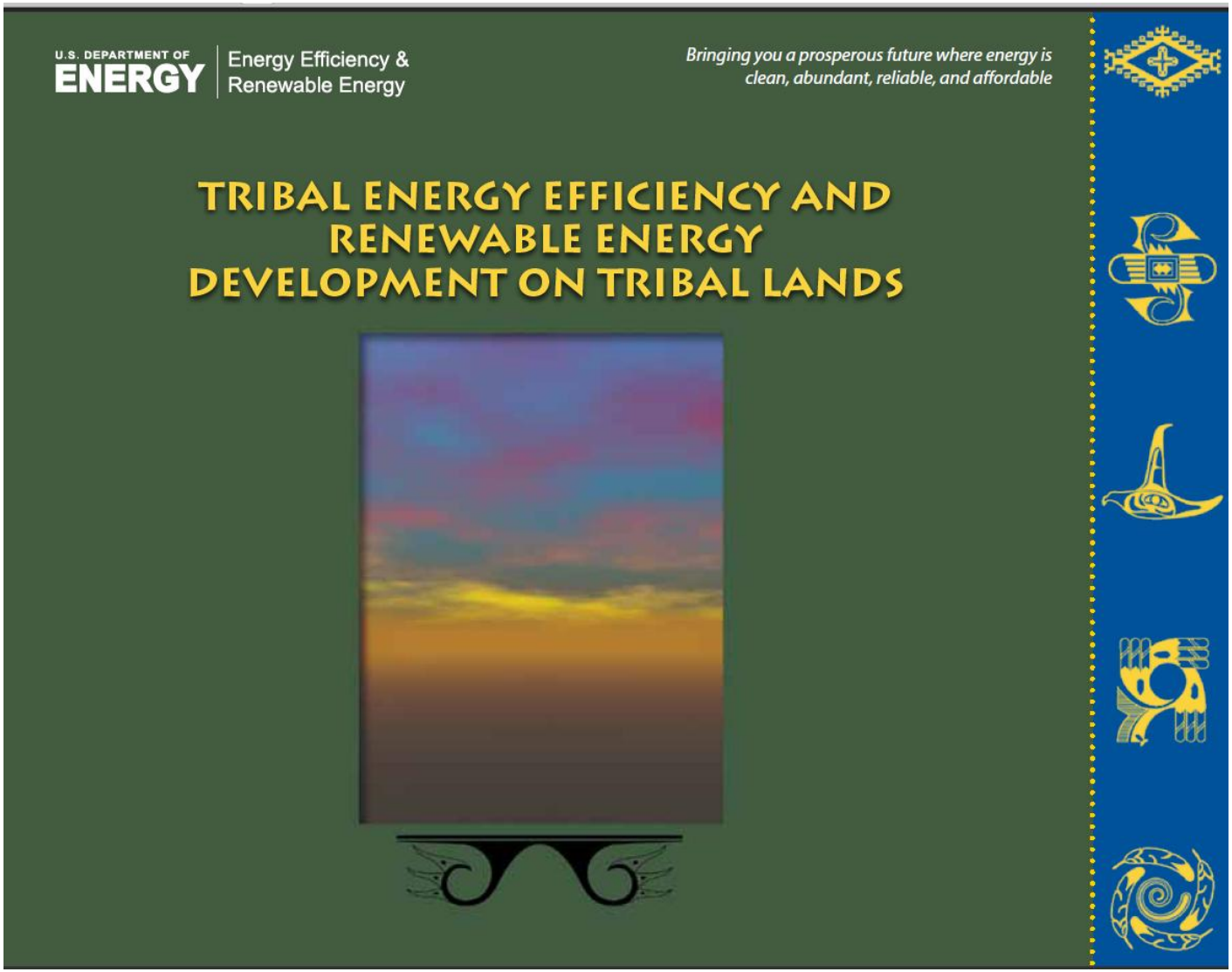


Tribal Energy Program: Technical Support

- **Annual Program Reviews (Denver)**

Year	Participants
2002	51
2003	113
2004	97
2005	114
2006	130
2007	131
2008	182
2009	262
2010	228
2011	204
	1,512

Tribal Energy Program: Technical Support



Collaborations/Presentations

- **CERT** formal Peer Review, ‘06
- **DEMD** NAEMI-branded training courses in Biomass, Solar, RE Analysis & Economics, and WEATS, ‘06
- **CERT** Energy Efficiency meeting, ’06
- **Alaska** Wood Energy Task Group, ‘06
- **Interior**, DEMD proposal reviews, ’07
- **Green-Build Conference** – Denver, November ‘07
- **BIA Providers Conference** – Anchorage, November ‘07
- **Intertribal Agricultural Council** ’07
- **Alaska Village Initiative’s** annual meeting ‘06-‘07

Collaborations/Presentations (cont.)

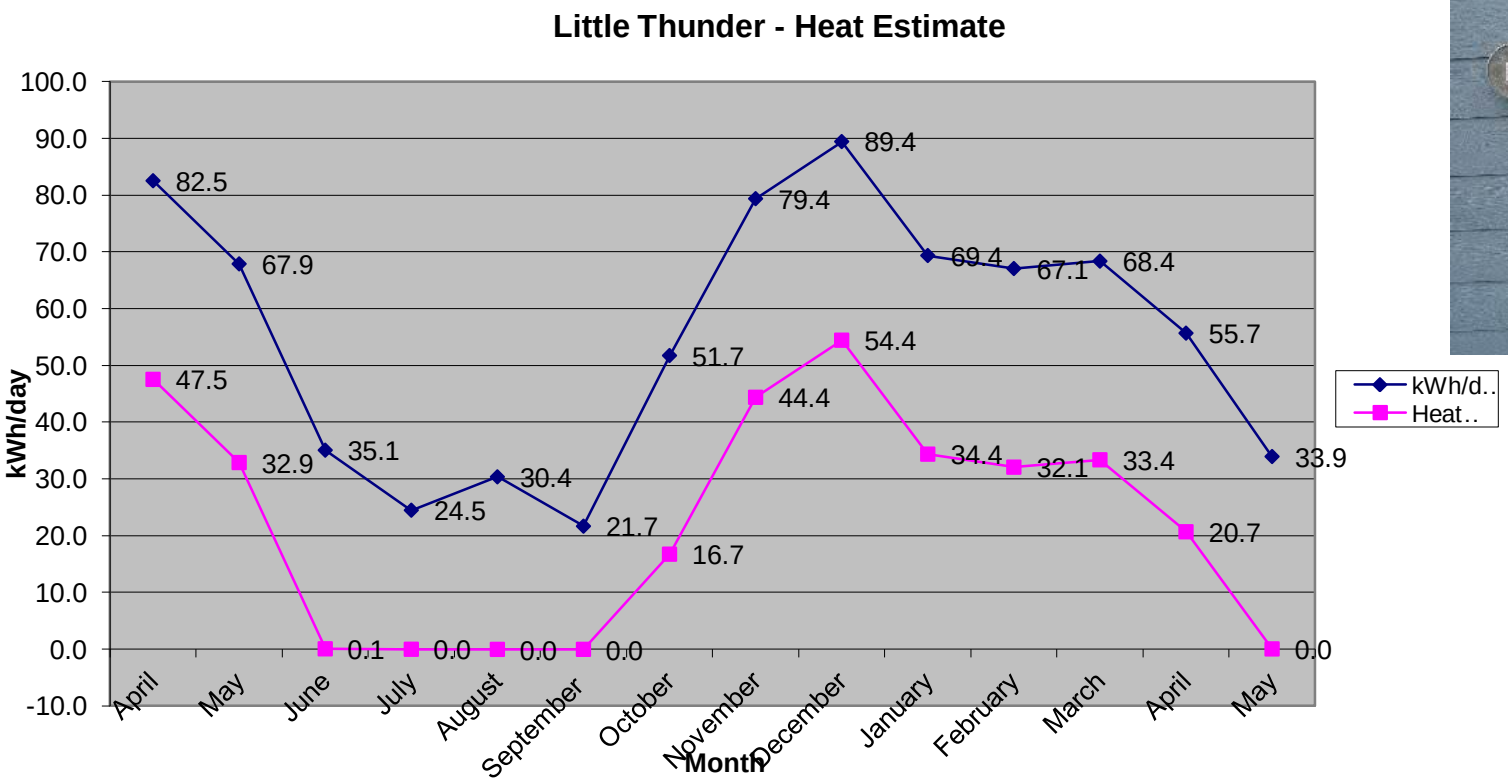
- **Alaskan** Environmental Forum, ’07, ‘10
- **Wisconsin** Energy Summit, ’07
- **Alaska** Wood Energy Conference, ’07
- **NAIHC** (National American Indian Housing Council), ‘06, ‘08
- **Nevada** Intertribal Consortium, ’09
- **Renewable Energy in SE Alaska** – Sitka, ‘09
- **BIA Providers Conference** – Anchorage, ’09
- Subcontract: **AIHEC** (American Indian Higher Education Consortium) ’10

Tribe-specific TA or Presentations

- **2006**
  - Rosebud Sioux, SD demonstration home project
  - Umatilla, OR wind data analysis
- **2007**
  - Inter-Tribal Timber Council BOD meeting , Portland
- **2009**
  - Santo Domingo Pueblo, NM
  - Ft. Peck, MT (Wind workshop)
- **2010**
  - Rosebud Sioux Tribe, SD regional RE Development Conference; San Carlos Apache, AZ
- **2011**
  - Taos, NM; Spirit Lake, ND; Fallon, NV

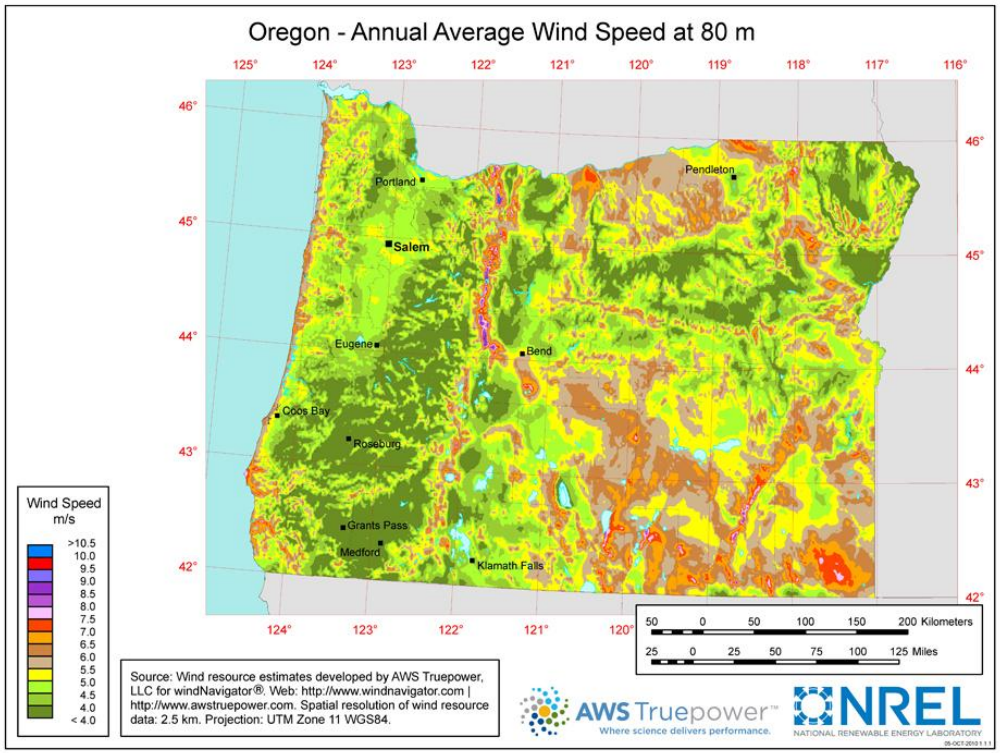
Tribe-specific TA or Presentations

- **2006** **Rosebud Sioux, SD demonstration home project**



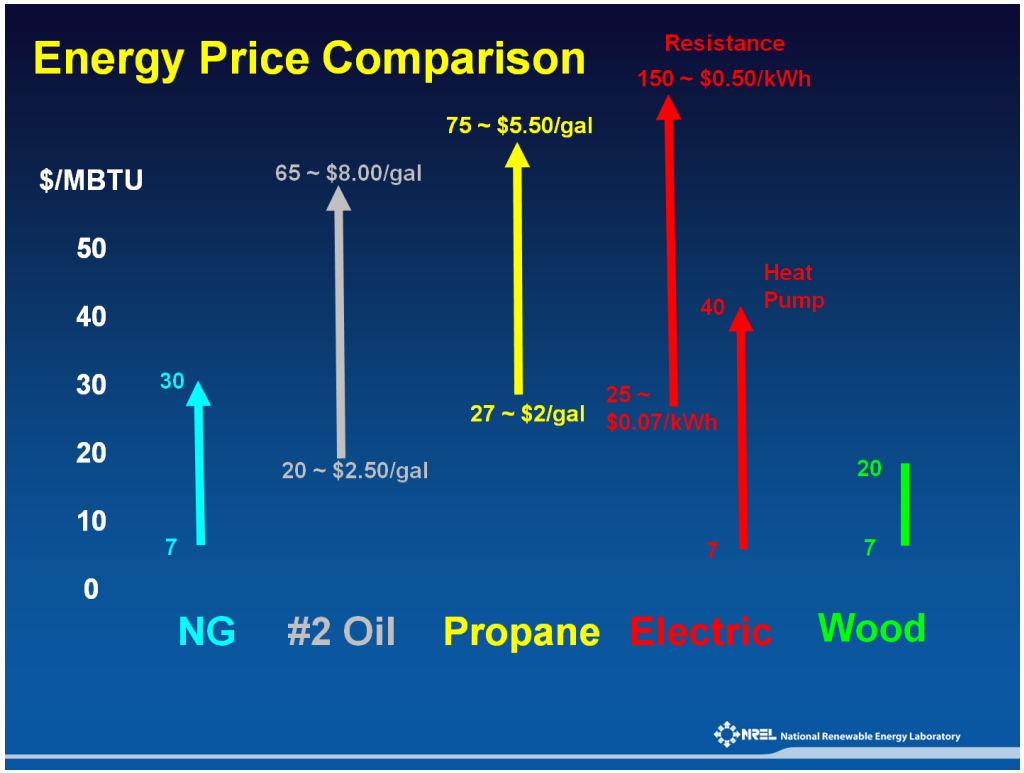
Tribe-specific TA or Presentations

2007 Umatilla, OR wind data analysis for wind farm investment



Tribe-specific TA or Presentations

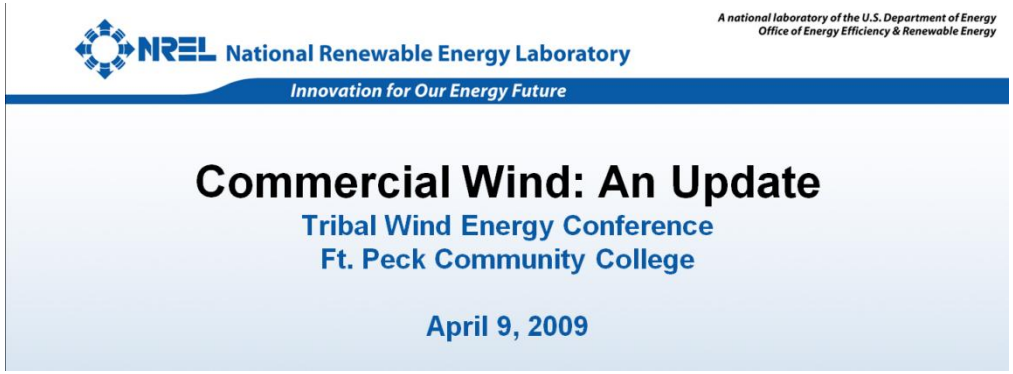
2007 Inter-Tribal Timber Council BOD meeting , Portland



Tribe-specific TA or Presentations

- **2009**
  - Santo Domingo Pueblo, NM

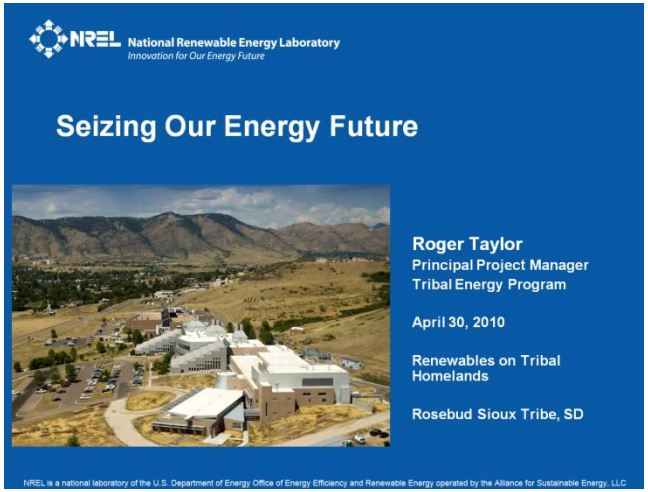
  - Ft. Peck, MT



Rosebud Sioux – 1999 to 2010

Tribe-specific TA or Presentations

2010 Rosebud Sioux Tribe, SD regional RE Development Conference

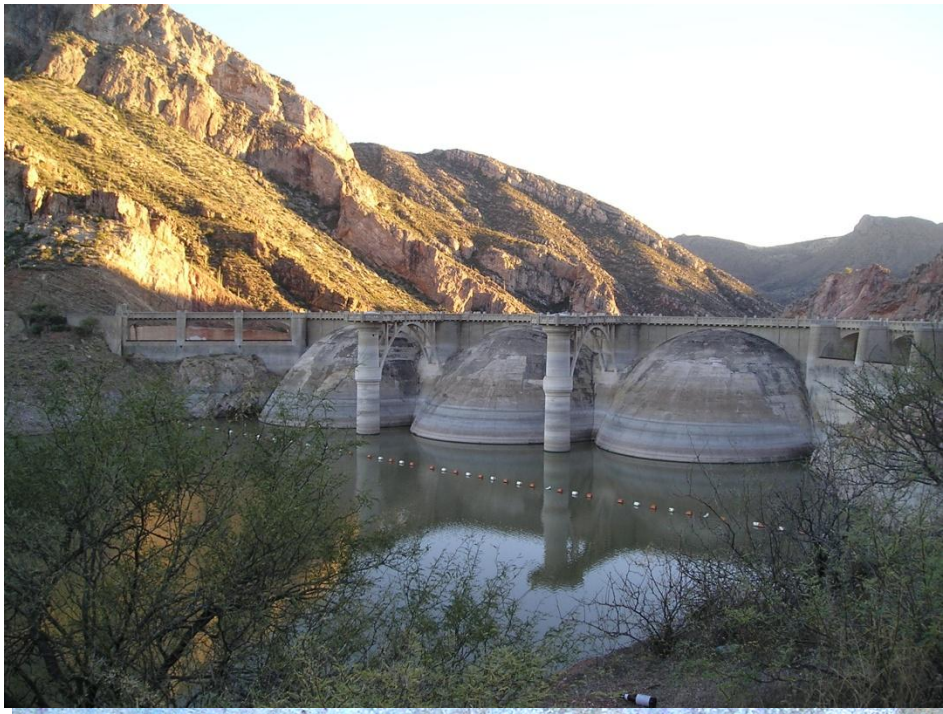


Tribe-specific TA or Presentations

2011 Taos, NM: Renewables Opportunities, Advice to Tribal Planner

Tribe-specific TA or Presentations

2010 San Carlos Apache, AZ
Tribal Renewable Energy Workshop



Tribe-specific TA or Presentations

2011 Spirit Lake, ND: EPA, FEMA, Tribe

Alaska Technical Assistance